TE-1000 Hi-Vol One-point Flow Verification Data Form

Site Information

Full Site Name: Xact - NIPSCO

Site Abbreviation: XAC Sampler Serial No.: 49524619

Field Technician Name: Kate Haile & Katie Healy Date: 6/25/21 Time: 13:35 CST

Site Conditions **allow Temperature/Pressure standard to acclimate for 10 minutes before reading*

Temp/Pressure Standard Make/Model: Delta Cal DC1

Temp/Pressure Standard Serial No.: 34 Temp/Pressure Standard Certification Date: 8/18/2020

$T_{amb\ transfer\ standard}$ (°C) 23.5 T_{amb} (K) 296.5 *$T_{amb\ transfer\ standard}$ (°C) + 273 = T_{amb} (K)*

$P_{amb\ transfer\ standard}$ (mmHg) 741

Calibration Orifice/Manometer Information

Orifice Make/Model: Graseby/Tisch Orifice Serial No.: 62K

Orifice Slope "$m_{orifice}$": 10.46067 Orifice Intercept "$b_{orifice}$": -0.16706

Orifice Certification Date: 2/4/21

**if using a "U" tube manometer, write "U-tube" in Make/Model and leave the other spaces blank*

Manometer Make/Model: Dwyer 435 Mark III Manometer Serial No.: 007947

Manometer Certification Date: 2/4/21

One-Point Flow Check Procedure

**flow check is to be performed after the 5th scheduled sample run of each month*

1. Set up the sampler as if performing a flow calibration with certified orifice and manometer. No sample media should be inside the module.
2. Turn on the hi-vol's motor at the Magnehelic Setpoint (found on TE-1000 Calibration Data Form) for 10-15 minutes. If the ambient Temperature and Pressure are significantly different from the day the calibration was performed, the Magnehelic Gauge Setpoint may need to be recalculated using the following equation:

   $$Magnehelic\ Setpoint\ (inH_2O) = \left(\frac{P_{amb}}{T_{amb}} * \frac{298K}{760mmHg}\right) * \left[\left(m_{hivol} * 0.225\frac{m^3}{minute}\right) + b_{hivol}\right]^2 = 45.6$$

3. Record the Magnehelic Gauge Pressure and the Manometer Pressure.
   $P_{Magnehelic}$ (inH_2O) 46 $P_{Manometer}$ (inH_2O) 4.4
4. Record m_{hivol} and b_{hivol} from the TE-1000 Calibration Data Form:
   Hi-Vol Slope, m_{hivol} 38.5293 Hi-Vol Intercept, b_{hivol} -1.8446
5. Calculate the Magnehelic flow rate using the following equation: KMH 6/25/21

   $$Q_{Magnehelic}\left(\frac{m^3}{min}\right) = \frac{1}{m_{hivol}} * \left(\sqrt{P_{Magnehelic} * \left(\frac{P_{amb}*298K}{760mmHg*T_{amb}}\right)} - b_{hivol}\right) = \text{~~0.214~~ } 0.222$$

   **T_{amb} should be in degrees Kelvin: T_{amb} (°C) + 273 = T_{amb} (K)*
6. Calculate the Manometer flow rate using the following equation: KMH 6/25/21

   $$Q_{Manometer}\left(\frac{m^3}{min}\right) = \frac{1}{m_{orifice}} * \left(\sqrt{P_{Manometer} * \left(\frac{P_{amb}*298K}{760mmHg*T_{amb}}\right)} - b_{orifice}\right) = \text{~~0.22~~ } 0.214$$

   **T_{amb} should be in degrees Kelvin: T_{amb} (°C) + 273 = T_{amb} (K)*
7. Calculate the percent difference between $Q_{Magnehelic}$ and $Q_{Manometer}$:
   Percent Difference = 100(1 – ($Q_{Manometer}$ ÷ $Q_{Magnehelic}$))* = 3.6 %
8. **Is the Percent Difference ≤±10%? (YES) NO (circle one)**
   a. If YES, flow check is complete.
   b. If NO, use the TE-1000 Operator's Manual to troubleshoot and retry the flow check. If the issue persists, the sampler will need to be recalibrated. Contact the Project Leads.